SAND BANKS DYNAMICS: KWINTE BANK STUDY CASE

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Linear sandbanks are a significant feature on many continental shelves, widely occurring whenever tidal currents are sufficiently strong and abundant sand is available. The Belgian coastal zone is characterized by a large number of these features. In particular several studies have been carried out at the Kwinte Bank within the framework of the *Marebasse* project (*M*anagement, *R*esearch and *B*udgeting of *A*ggregates in *S*helf *S*eas related to *E*nd-Users), which is studying the effects of dredging and dumping operations on marine environment. Within the project, the influence of tidal currents on sand bank evolution has been investigated in detail; however, little is known concerning the effects of waves on the sand bank dynamics.

During this study different numerical models have been applied to gain insight on the hydrodynamics and morphodynamic processes occurring around the sand bank and predict future evolution due to the combined effects of currents and waves. Currents were calculated by the two-dimensional hydrodynamic model TELEMAC-2D (Hervouet *et al.*, 1996); results from the hydrodynamic model were compared with the output from the three-dimensional hydrodynamic model COHERENS (Luyten *et al.*, 1999) and validated against ADCP measurements. The wave field was computed by the wave model TOMAWAC (Benoit *et al.*, 1996); the output was compared with results from the WAM model (WAMDI group, 1998) and validated against buoy measurements at different locations. The sediment transport under combined effect of waves and currents was computed by the SISYPHE model (Villaret, 2004), internally coupled with the TELEMAC-2D model. Results were compared with the output from the MU-SEDIM model. Several formulations for sand transport were assessed under different hydrodynamic and wave conditions. Simulations show a significant variation in bottom evolution whenever wave activity is sufficiently high, demonstrating how wave action can be a relevant sand bank morphodynamic agent.

References

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